Planning my Farm Business

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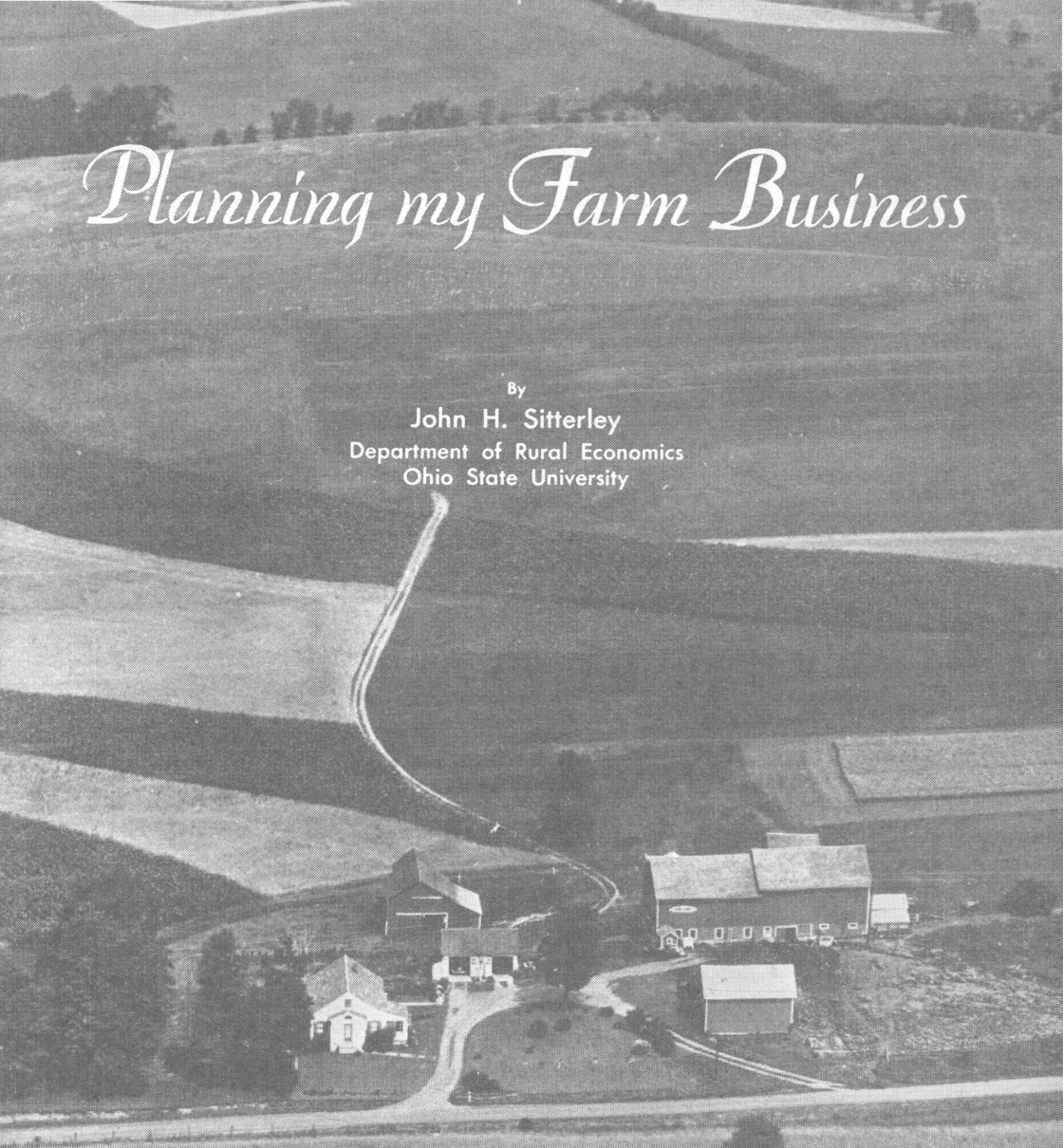

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Planning My Farm Business

Characteristics of a Good Farm Organization

All farmers are interested in obtaining as nearly as possible the maximum continuous income, if we define the term "income" broadly enough to include the pleasures and satisfactions of a non-material nature as well as those of a material nature or money return. Most farmers are interested in both. Some are largely interested in the money income; others place more emphasis on the non-material pleasures and satisfactions to be secured from farm life.

Regardless of the type of income desired — to obtain the maximum of the type sought — it is necessary to plan and frequently re-plan the organization and operation of the farm if the desired goal is to be reasonably well attained with a minimum of money cost and human effort.

In most instances the farm organization that will produce the maximum continuous net money income will produce the greatest total satisfactions of both types throughout the farmer's active life. Assuming this to be true, what are the characteristics of such a farm organization?

1. The first characteristic of a farm organization that will yield a high continuous income is that all of the resources which the farmer has at his command be utilized as FULLY as possible. These resources are: (a) his real estate, which includes his land, buildings, fences, tile drains, and water supply; (b) his working capital, which includes his livestock, power, machinery, equipment, and operating supplies; (c) his own and any available family or hired labor; and (d) his market facilities and opportunities.

A farmer who has some resource that may be used productively but which remains idle will probably not obtain the maximum income possible. Hired labor, family labor, labor of the operator that is not fully utilized, or a farm with a good market outlet for some product that could be produced successfully but that is not now being produced are illustrations of idle resources.

2. The second characteristic is that all of the productive resources available be used as EFFICIENTLY as possible. It combines them into the type of organization for which they are best adapted, and distributes them among the various enterprises included in that organization so that they are used to approximately equal advantage in all cases. On many farms most of the productive resources are used in some manner, but they are often so inefficiently used that a much smaller income is obtained than would be the case if they were more efficiently used.

During the past few years much time and thought have been given farm unit planning by members of the Rural Economics Department of the Ohio State University. The author wishes to acknowledge and express his appreciation for the valuable suggestions and criticisms given him by the members of the department in the preparation of this publication.

A farmer who uses his land, labor, and capital in the production of some crop or type of livestock that is not adapted to his situation uses them to disadvantage. Inefficiency may also exist in the organization, even though the correct type of farming is used, through an improper distribution of resources among the various enterprises. For instance, the farmer who invests capital in usable but unnecessary equipment when other pressing needs exist for such things as lime, fertilizer, improved drainage, better livestock, etc., will get a lower return than if less had been spent for unnecessary equipment and more for other pressing needs..

Another common source of low return from the use of resources, particularly labor, occurs as a result of keeping poor quality livestock, using improper power and equipment, poor field and building arrangement, and the like.

3. The third characteristic of an organization that will yield a high continuous income is that it MAINTAIN its productive resources. Otherwise, the income producing possibilities would not be as good in 10, 20, or 30 years as they now are. This means not only maintaining adequate farm power, machinery, buildings, fences, tile drains, and the like, but also maintaining the soil. In the past, most farmers have been aware that it was necessary to repair, improve, and replace machinery, buildings, and fences. Relatively few also recognized the necessity of maintaining the productivity of their soil, and conserved it. In the pioneer period of agriculture, some exploitation of the more fertile land yielded a larger income to the individual operator than a conservative type of farming. However, with the decreasing productivity of the soils, efficient use of labor and capital and the continuation of present productive capacity will only be possible if exploitation of the soil resources is stopped and, in many cases, improvements and replacements made. This is now recognized by many farmers who are finding that yields do become smaller unless the amounts of labor and capital expended in producing them are continually increased.

UNPREDICTABLE FACTORS AND INSUFFICIENT INFORMATION MAKE PLANNING DIFFICULT

Before attempting to develop a plan for a good farm organization, let us first recognize certain facts and limitations. The most important of these are:

1. Due to the many uncontrollable, unpredictable factors associated with farming, such as weather, insects, diseases, price changes, and the like, one can only hope to set up a farm organization that, over a period of years, will produce an income approaching the maximum. In reality it is quite improbable that anyone will succeed in developing a farm organization for a particular farm and farmer which will give the maximum continuous income.

2. There is no single plan or organization for a particular farm and farmer. The variation in possible farm organization is large, and it is highly

probable that two or more plans may be so nearly equal that a definite decision cannot be made other than on the basis of personal likes and dislikes.

3. The farm organization which works well today may not be equally satisfactory in 10 or 20 years from now, and, as time and change bring new conditions of a fairly permanent nature, the farm organization will need to be reshaped.

4. Every farm with its operator presents a separate and individual problem of farm organization. Consequently, no one plan of farm organization will fit all or even most of the farms in the same community without some modification from farm to farm. This may be due to differences in the experience and ability of the farm operator and his family. It is thus necessary for each farmer to develop his own farm organization.

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Invoicing and Appraising the Resources

How can an individual farmer proceed to construct a new or rebuild an old organization that will yield something near a maximum continuous income? Before he can build such an organization he must first evaluate the resources at his disposal. An honest, thorough invoicing of these is the most logical starting point.

A safe guide to follow in invoicing and appraising the resources of a farm is to include everything tangible and intangible that may now, or in the future, have a bearing on the organization and operation of the farm.

The extent of the task involved in listing and appraising these resources varies from farm to farm, and to a large extent depends on how familiar one is with the farm being invoiced. Long familiarity with the farm does not relieve one of the necessity of actually taking an inventory and making a thorough appraisal when reorganizing or developing a new plan of organization.

Map of Field Arrangement and Land Use

A logical starting point is with the land. This calls for a map, so one of the first things to do is to obtain a good map of the farm. It should be drawn to scale, and be sufficiently large to permit one easily to map the interior arrangement, soil types, drainage, etc.

Many farms have recently been mapped by the A.C.P. and the acreages recorded by fields. If such a map is available, it will eliminate the necessity for measuring the fields and preparing a new one. After obtaining some outline maps, trace in the present field arrangement and land use. From this map, showing field acreages and present use, one can then obtain the generalized information on the present land use.

Land Resources[1]

Soils.—One should walk over the farm and trace on a map as accurately as possible the principal soil types. He should take soil samples to determine the lime and fertilizer needs. The samples should then be taken according to the directions contained in the Ohio Agricultural Extension Service Bulletin 190, "Soil Testing As a Guide to Soil Management."

Topography.—The topography of the land should be appraised as one walks over it with the idea of determining the limitations, if any, that it places on the manner in which the land can be used; whether it will in any way influence the size and type of machinery and power; and what its effect will be on the type of rotation and tillage methods, measured in terms of the need for conserving the soil. The type and extent of care needed to control erosion should be recorded. If there is sufficient slope to result in any appreciable amount of run-off during moderate to heavy rains, some sheet erosion has occurred even though there are no gullies in evidence.

Drainage.—All wet spots of sufficient extent to limit in any way the normal farm operations should be recorded and an effort made to determine the extent of the problems involved in eliminating the most troublesome spots. The general condition of the existing drainage system is to be noted and needed improvements recorded.

Climate.—Any climatic peculiarities that may favorably or unfavorably influence the farm organization such as short growing seasons, late spring frosts, poor snow cover, excessive freezing and thawing, high summer temperature, the amount and monthly distribution of rainfall, and the like are all to be considered.

Soil Productivity (crop yields).—Invoicing soil, topography, drainage, and climate reveals to a certain extent the natural productive quality of the land, but the black soil on one farm may be much less productive than the black soil on another farm, due to its past treatment. Thus, in order to obtain a true invoice of the present land resources, one must examine them with the idea of determining what the present crop yielding capacities are.

The determination and listing of the present average or expected yields under the current method of operation for the various crops is a relatively simple matter for the farmer who has lived on his farm a few years or who is familiar with the farm being invoiced. He will have no great difficulty establishing the average yields as it is now managed. He may also have a fair idea about the yields that his neighbors are obtaining in the case of some crops which he is not now raising or has not raised.

A more difficult task is encountered in establishing the present average or expected yields when one has not previously operated the farm and has

[1] The relationship of present land use, topography, drainage, and productive capacity of the land to the use to be made of the land is more fully set forth in the sections dealing with the determination of the use to be made of the land, page 11.

little or no previous knowledge of the crop yield history of the farm. If unfamiliar with the types and the normal productivity of the soils that are present on the farm, information relating to these may be secured by referring to the Ohio Experiment Station special circular 44, "A Key to the Soils of Ohio," or by contacting the Agronomy Department at the Ohio State University, Columbus, Ohio, or the Agricultural Experiment Station, Wooster, Ohio.

Some further suggestions for establishing yields in such a case are: (a) Talk with previous operators, neighbors, local elevator men, the local thresher, the local A.C.P. office, the county agent, etc.; (b) inquire about the amount of livestock sold and feed purchased; (c) calculate storage space for crops (average total production seldom exceeds the present storage capacity); (d) examine the size of cornstalks, thickness of small grain stubble, meadow, and kind of weeds.

When making estimates of present average yields, allowance should be made for shrinkage after storing; the type of fertility practices followed in producing these yields should also be recorded.

Buildings and Fences.—All farm buildings should be listed and appraised as to suitability and adaptability for various uses and their present capacity for livestock, equipment, and feed. Requirements for repairs and upkeep must also be considered and recorded. Fences should be carefully checked to determine their condition and needed repairs. Likewise, they should be examined with the idea of rearranging the fields if it seems desirable.

Location and Market Resources

These resources will include: (a) location with regard to consuming centers; (b) distance to local assembly points for livestock, livestock products, grains, truck crops, and fruit; (c) market outlets and facilities such as fluid milk plants, cooperative selling, grading, packing, and shipping associations, canning factories, sugar beet plants, evaporated milk and cheese factories, and the like; and (d) transportation facilities such as local road conditions, trucking and railroad facilities, and shipping rates. These all form a part of the resources of a farm, and all have a distinct bearing on the type of farm organization that should be followed if the maximum income is to be obtained.

A complete invoicing and listing of ALL available market outlets and facilities, including those under (c) above, whether they are at present used by the farm or not, is necessary if no market resources are to be overlooked. Often a change will have occurred in an old market, or a new market will have developed in a community that is at present being overlooked, which, if used, may either provide a more profitable market for a product already being produced or for a product which can readily be produced to advantage.

Capital Resources

Capital available in the form of money and equipment shape to a considerable extent, at least for a time, the type of farm organization that can be

followed. It is well to invoice in considerable detail all working capital such as machinery, power, livestock, and supplies, listing not only present money value but, in the case of livestock, quality and productivity, and, in the case of machinery, size and the probable serviceable life. After having placed a value on the various types of capital available, it is then desirable to make out a detailed financial statement similar to that required by a bank in order that one may ascertain his net worth.

Labor Supply

The labor supply to be considered first is that of the operator and his family, as this makes up the fixed labor supply which cannot be reduced without making some of the family unemployed. If, in addition to the family, one or more men are regularly hired, this labor supply also must be taken into account. The necessity for carefully measuring the labor supply available is obvious when we stop to think how differently the organization must function in a case where only one man is available for working a 100-acre farm compared to an instance where the full time of two men is available for such a farm.

Managerial Experience and Ability

The most intangible yet possibly the most important resource involved in operating a farm is the management, the farmer himself. Differences in the capabilities of operators to organize and operate a farm are as varied as the productive capacities of different soils.

Two men equally industrious will by no means achieve the same degree of financial success in the same type of farming. One man may have the capacity to organize and operate a complicated and exacting type of farming, the other, the ability to organize and successfully direct a more simple, less detailed, and less exacting one. If both try to operate a complicated type of farming such as purebred livestock production, orcharding, certified seed production, and the like, obviously one will be less successful than the other and possibly may fail. But if each uses the type of organization that he has the capacity to manage, both will have a greater chance for success.

The invoicing of one's ability is most difficult, but must be done with reasonable accuracy, if the organization developed is to give as nearly as possible the maximum income. With the assistance of one's family and by listing those agricultural enterprises that one has successfully conducted and the enterprises with which one has had some experience, one can evaluate his managerial experience and ability with a fair degree of accuracy.

An account should also be taken of the skill and ability of the available labor supply, because the limiting factor to some types of farming may be a supply of labor capable of doing efficiently the type of work involved.

Selecting the Type of Farming

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After having invoiced and appraised the individual resources that are available and out of which one must construct his farm organization, it is desirable to weigh and appraise them collectively. This is necessary if one is to select a type of farming that will employ all resources in a manner that will make possible the maximum continuous income.

Influence of Nature of Resources on Type of Farming

The inventory of every farm includes two general types of resources. One group includes those that are rather rigidly fixed and are subject to only slight modification by man, such as soil type, topography, climate, and the location of the farm with respect to markets. The other group of resources are those that may be modified, as the size of the farm, the buildings, fences, capital, labor, the managerial experience, and to some extent the productivity of the soil.

Land with a steep or rolling topography is poorly adapted to the frequent production of intertilled crops, such as corn, because the natural character of the land leads to erosion and excessive loss of moisture due to run-off. The lack of soil moisture and the erosion both tend to lower the yields. The erosion and run-off may be partially controlled by special conservation practices, but this extra care often results in higher production costs. Thus the producer of such crops on poorly adapted land is at a distinct disadvantage when he must compete with producers on land better adapted to these crops.

The production of any crop may not prove to be economical when any of the fixed resources are not adapted to it. The lack of a market outlet or market facilities likewise is often as formidable a barrier to the economic success of some enterprises as are climate, soil type, topography, etc., and about which the individual farmer can do but little more.

Among the second group of resources, those capable of being modified by man, are items such as the area of the farm and size and character of the buildings, which are semi-fixed and may not be economically modified except over long periods of time. Others of these, such as type of livestock, equipment, and amount of labor, may be changed fairly rapidly. The productivity of the land also can generally be improved over a period of a few years by the use of lime, commercial fertilizer, livestock, and green manure crops. To bring about a change in any of the resources that are capable of being modified in order to better adapt them to some proposed use will require time and some outlay of capital.

Since every farm has some resources of both types, the farmer, in analyzing and interpreting his inventory, should attempt to eliminate those types of farming or enterprises that do not adapt themselves to the resources that he cannot change. Otherwise, he will be working against rather than with nature.

He need not exclude from his thinking the possibility of the use of a type of farming or an enterprise that does not adapt itself at present to those resources, the character of which may be fairly rapidly and economically changed so that the type of farming or the enterprise will work successfully. It will be necessary for him to take into account the time, labor, and capital needed to bring about the change as this will affect the length of the transition period required to put the new enterprise or type of farming into operation.

Compromise Among Uses of the Resources May be Necessary

When studying the inventory of resources, each important class of resources (land, including market location; capital; labor; and management), should be studied individually to see what each can advantageously contribute. It must be kept in mind that the various resources, to be productive, must be combined with one another. But, it is highly improbable that it will be possible to combine them in such a way that each resource will be used in its most productive manner. For instance, one may have land at his disposal which includes a soil and climate capable of producing large quantities of high grade vegetables. But, if he does not have a satisfactory market for them, nor a labor supply or managerial ability to produce them, he cannot combine his resources into a profitable vegetable farm.

On the other hand, if the land is used for the production of general farm crops and livestock, a better combination of existing resources may result and a more profitable organization will exist, because the available labor and management are experienced in their production and the local markets are equipped to handle these products. Thus the organization that will yield the maximum continuous income for this particular set of resources will NOT utilize the land for the purpose for which it is best adapted. On many farms, it will be necessary to compromise in the use to which the various resources are to be put in order to achieve the most productive combination.

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Dividing the Farm Into Crop, Permanent Pasture, and Woodland

On some farms there is no problem as to the land that will be used for crops, permanent pasture, and woods. But on many farms, it may be desirable to shift poor or eroded crop land to permanent pasture, level permanent pasture to crop land, eroding and rough pasture to wood, and strip crop or practice contour farming on the crop land.

Some of the more important things to be taken into account in planning the use of the land are: (a) the manner in which the land is at present used; (b) topography and erodability of the soils; (c) drainage and flooding; (d)

productivity of the land; and (e) accessibility from the standpoint of working the land. Much or all of the information needed to enable one to determine how best to use his land will have been noted at the time the resources were invoiced and appraised.

Influence of Present Land Use.—The manner in which the land is used at present affects the future use of the land through the cost in terms of money, labor, and materials incurred in making changes in the type of use. For instance, the cost of converting woodland or marsh land into crop land may be so high that the net income obtained from the new use, even though the reclaimed land is productive, will be little if any higher than that obtained from its former use. Other changes, however, may be made with little cost, such as the retirement of unproductive crop land to permanent pasture or eroding and exhausted pasture land to woodland.

Influence of Topography and Erodability.—Topography is often the major factor limiting the type of use that can be made of the land by the farmer. In areas where the land is sufficiently level that nothing more than reasonable caution is needed to control erosion, the individual farmer will be able to work out the desirable use without difficulty. In other areas where sheet and gully erosion are to be reckoned with, it may be necessary to draw upon local conservation specialists to appraise the topographic situation and designate the land which is too steep for crops, areas to be contour farmed, and areas requiring other precautionary measures.

In general, land that is sufficiently level for ordinary farm machinery to be operated on it without undue difficulty and that, when planted to row crops such as corn, will not subject the land to erosion, may be considered as potential crop land. Land too steep or rough, or both, to permit the satisfactory use of ordinary tillage tools, or which would erode severely if cropped, even if farmed on the contour, should be considered as non-crop land. The land between these two extremes—that which is sufficiently steep for erosion to be a factor, if it is to be controlled satisfactorily—must be used for pasture or operated under a system of strip cropping or contour farming.

Some of the land considered as non-crop land may possibly be so steep that it would not be possible to operate a mowing machine, manure spreader, or lime and fertilizer spreader on it, thus preventing one from carrying out any of the recommended pasture management practices. Such land should in most cases be considered as land not suitable for pasture but as potential woodland.

Influence of Drainage and Flooding.—The lack of adequate drainage or periodic flooding, or both, may necessitate using some land for permanent pasture that would otherwise be suitable for crops. These limitations may be of a temporary character and capable of being corrected, but in some cases the cost of the drainage or flood control, or both, necessary to convert the land into crop land may be so great as to make it uneconomical. All areas involving

drainage or flooding problems should be given due consideration in working out the land use plan.

Influence of Productivity of Land.—On some farms, sizable areas of land exist that at present are used for crop production, the productivity of which is so low (due to soil type, to being badly eroded, or to continuous cropping, or all three) that the net return to be expected from crop production is less than that to be derived from some other use such as permanent pasture or woods. If one has some crop land of this type it should, if possible, be put to some use more in line with its productive capacity.

Influence of Accessibility of Land.—The accessibility of land from the standpoint of economic operation is to be considered in planning the manner in which the land may be used. Fields which are a great distance from the buildings or that are difficult to reach due to the topography or other natural obstructions, if used in such a way as to require frequent trips to and from the field often have such high operating costs that the net return is less than that to be obtained from another use requiring fewer trips.

Planning the Cropping System

Requirements of a Good Cropping System

After determining which land is to be cropped, used for permanent pasture, and for forest, and whether the crop land is to be strip cropped or contour farmed, the next step is to develop a cropping system for the crop land. The starting point is to see what some of the chief requirements are that the cropping system must meet if it is to make a good continuous income. Some of the more important requirements are:

1. The cropping system must be such that it permits the whole farm organization to make the best possible use of all of the available productive resources.
2. The cropping system must not deplete the productivity of the soil resources if its income producing ability is to continue.
3. The cropping system must include as large an acreage as possible of those crops with the greatest income producing ability without depleting the soil, if it is to utilize the crop land resources to the best advantage.
4. The cropping system of farms where both crop and livestock enterprises are included in the organization must fit as smoothly as possible with the livestock enterprise if it is to be a well balanced organization.
5. The cropping system must not make excessive demands on the capital and labor resources to the detriment of other essential enterprises, otherwise the organization will be out of balance.
6. The cropping system must include as nearly as possible the same acreage of each type of crop each year if a uniform program of operation is to be possible.

With these requirements in mind, one should, if rebuilding an old organization, first examine and appraise the present cropping system to see if it meets these requirements, since the one that is being followed at the time may be very good and need little or no modification. If it fails to meet the requirements then it will be necessary to set up some new cropping systems from which one may be selected.

The process of developing a cropping system consists of selecting two or more crops that can be successfully grown on the land, determining the order in which they are to follow one another, the number of years each crop will occupy the land, and the cultural methods and fertility practices that will be followed. Obviously, several cropping systems can be set up for the same farm; however, the one finally chosen must meet the major requirements outlined above if it is to make its maximum contribution to the farm income. The use of a major and a minor rotation frequently makes it easier to accomplish this task, particularly if attempting to prepare a cropping plan that will permit compliance with the agricultural conservation program, since the two rotations allow greater flexibility both as to the acreage allotted to each crop and as to the variety of crops that can be included in the system.

Appraising the Old or Selecting a New Cropping System

Maintenance of Soil Productivity.—It is commonly known among farmers that some crops tend to lower the productivity and others tend to build it up. Cultivated crops such as corn, tobacco, or potatoes rapidly reduce the yielding capacity of the land. Small grain crops also have a depleting effect on the land, but somewhat less rapid than do cultivated crops. Meadow crops, on the other hand—particularly if they include a high percentage of clovers, alfalfa, or sweet clover—leave the soils in an improved state of productivity, as evidenced by increases in the yields of other crops when grown on land immediately following them. A few crops, as timothy and soybeans, are about neutral in their effect on the soil.

Obviously, some care must be exercised in the selection of the crops to be included in the rotation to see that those which draw heavily on the soil are offset by others that build it up, if the soil resources are to be maintained. In addition to the effect that crops have, it is generally known that the cultural methods and the fertility practices followed in raising the crops also influence the productivity of the soil, and therefore must be given consideration in the cropping system. The application of manure and commercial fertilizer and the plowing under of growing crops and crop residues build up the productivity. Exposing the soil to erosion by farming sloping land up and down the slope, and by allowing erodable soils to lie without a cover crop are some of the practices that lower the productivity rapidly.

There are for most farms more than one cropping system that will maintain the productivity, but some systems capable of maintaining the soil will

not contribute much to the farm income. This is largely due to the fact that the crop or crops often used to rebuild the soil, such as a mixed alsike-timothy meadow, are not only low in money value per acre but have little restorative effect. They must occupy the land for several years to offset the effect of one or more depleting crops. In other cases where good alfalfa, clover, or sweet clover meadows are used as the restorative crop, they need not occupy the land so long to offset the depleting effect of cultivated and small grain crops, thus permitting more frequent use of those crops which have a high money value per acre.

One can readily determine how well a crop rotation and its accompanying fertility program will maintain the productivity of the soil by utilizing the method devised by the Agronomy Department of the Ohio State University.[1] One may also arrive at a fairly accurate conclusion as to whether a cropping system is maintaining the productivity of the soil (if that system has been followed for a number of years), by studying the trend in yields and the cultural practices followed.

If yields have been maintained this does not necessarily mean that the cropping system is not depleting the soil, as the stationary yields may be due to increases in the amounts of fertilizer, lime, and manure applied; to changes in the type of seed; or to the thoroughness and timeliness of performing the various operations; or to all of these. If, after using more fertilizer, lime, and manure, better seed, etc., yields are stationary or but little higher than they were at the time the cropping system under consideration was started, then one may safely conclude that the soil is not being maintained. Declining yields, increasing difficulties in obtaining satisfactory legume meadows, and increasing evidence of erosion may be taken as rather definite evidence of the depleting effect of a cropping system.

In the case of an untried crop system, the safest and easiest method of determining how well it will maintain the soil productivity is to use the method prescribed by the Agronomy Department.

Income Producing Ability of Crops.—Does the rotation being considered contain as large an acreage as possible of the crops with high income producing ability without depleting the soil? In every community, it is generally recognized that some crops have greater income producing ability than others. In western Ohio there are few farmers who do not recognize that corn ranks high, and many place soybeans and wheat well up in the list. Some are familiar with the high income producing ability of good legume meadows, particularly when they include a high percentage of alfalfa. In the past, only an occasional farmer has fully recognized the true value of good legumes as producers of income. This income is largely of an indirect nature, appearing in the form

[1] Ohio Agricultural Extension Bulletin 175, "Our Heritage the Soil," contains a discussion of this method. Form 4308, "The Soil Productivity Balance of Cropland," provides the forms and instructions necessary for determining how well a cropping system will maintain the soil productivity. These will be supplied upon request by your County Extension Agent.

of increased livestock products as a result of a larger quantity of a higher quality of pasture and roughage, and through its beneficial effect on the productive capacity of the soil.

In some areas in the state special crops might be added to this list, but in the greater part of Ohio where the nature of the land is suitable or can be made so, corn, good legume meadows, wheat, and soybeans are the high ranking crops in terms of ability to produce income. If the problem arises of choosing between two or more proposed crop plans on the basis of which has the largest amount of crops with high income producing ability, the total gross money value of all of the crops contained in each of the rotations may be computed by multiplying the average annual total production of each crop by the long-time average price of each crop. One must, however, keep in mind the costs as well as gross value when making such a comparison, because the rotation with the highest gross value does not always give the largest net return.

Relationship of Crops to Livestock Program.—In a farm organization in which crop production is to be the only or the chief enterprise and little or no livestock is to be produced, one need give little or no thought as to how well the cropping system will mesh with the livestock. However, on the farm where it is considered essential that the organization also include livestock, the rotation must be such that the two fit together so that they will complement each other as far as possible. This calls for mutual give and take between the crop and livestock program. The crop program on the majority of the farms must produce most of the feed required by the livestock, and the livestock must depend to a considerable extent on the crops that can be economically produced without subjecting the land to soil depletion and erosion.

If the nature of the land resources limits the type and amount of the crops, then the livestock program must be adjusted to these crops. If there is some room for adjustments both as to type and amount of crops that can be satisfactorily produced, then some changes may be desirable in the crop systems to permit the use of a more workable livestock program.

Obviously, before one can adjust a crop program to the livestock program, the livestock program must be tentatively known. Before the tentative livestock program can be worked out one should know rather definitely the type and amount of each crop that can be produced on the land with the available capital and labor resources. Thus it is necessary for most farmers, when drafting a farm organization, to prepare one or more tentative crop plans which will use to good advantage the resources involved in crop production, and at the same time adequately support the type of livestock that appears to be best adapted to the situation.[1] A final choice of a crop program will in most cases not be possible until the livestock program and the plan for getting the work done have taken more definite form. A discussion of these appears on pages 18 to 30.

[1] The general character of the livestock program has been partially arrived at earlier by studying and analyzing the available resources. See section on selecting the type of farming, page 9.

Regularity of Crops in Rotation.—Approximately the same area of each individual crop in the rotation each year is essential if any degree of stability in the scale of operations is to be attained. A crop system that has a large acreage of corn and a small acreage of meadow one year, and a small acreage of corn and a large acreage of meadow the next will cause great fluctuations in the labor, power, seed, fertilizer, etc., required, the amount and kind of livestock that can be kept, and in the volume of products available for sale.

Too often, the crop system is worked out on the basis of the size and number of fields available rather than by selecting the rotation and then adapting the field arrangement to it. Even the best combination of crops, if fitted to a field system that results in great variation in acreage, will be unsatisfactory. Over a period of time the return from a good crop system will more than pay for the trouble of rearranging the fields to fit the rotation.

Sequence of Crops in Rotation.—A thing to consider in selecting a crop rotation is the order in which crops follow one another. Some crops are only capable of adding to the income when they are fitted into the rotation so that part of the cost is eliminated. This is the case when the preceding crop leaves the ground in condition for sowing without plowing. Plowing is a costly operation and the fewer times that the land need be plowed the lower the cost of operation. Thus, whenever possible, the crop rotation should include those crops which, when arranged in the proper sequence, require the minimum of plowing each rotation.

Competition for Land, Labor, and Power.—There are few rotations which will meet the other requirements of a good crop program that will not contain some crops that compete with one another at some time during the year for the land or the labor, or power and equipment. This being the case, it may be more desirable on the larger farms to overcome the competition by selecting and owning a type and amount of power and equipment that will do the task at the peak periods, rather than to substitute some rotation that contains fewer peak periods but is less satisfactory otherwise. On the smaller farms consideration should be given to the hiring of some additional power and equipment to meet the peak requirements. It is necessary, however, to use caution in attempting to overcome an excessive amount of competition by using additional amounts of power and equipment, since the added cost may more than offset any advantages the rotation may have.

Potatoes and corn, early soybeans and corn, first cutting alfalfa and corn cultivation, and corn cutting and wheat seeding are some of the more common examples of crops that compete with one another for labor and power. Corn and oats, corn and late sowed soybeans used either for hay or grain, and corn husked from the standing stalk and wheat sowed on summer plowed land are examples of crops that are almost non-competitive. Probably the most common peak labor period occurs in June, and arises as a result of corn cultivation, hay making, and wheat harvest. If a large quantity of hay is to be

made it may be desirable to include in the rotation two or three types of hay crops that mature at different times, rather than one type which, if it is to be good quality hay, must be harvested in a period of 6 to 8 days. By using two or three different hay crops, as alfalfa, red clover, and soybeans, the hay harvest can be distributed over a longer time and thus reduce the competition.

Competition for land such as that which develops between tilled crops as corn, sugar beets, potatoes, tobacco, canning crops, and soybeans, for that part of the crop land that is to be plowed and tilled in any one year presents a different problem. Either the land that is available to be plowed and tilled must be divided among the tilled crops, thus reducing the acreage of each, or more land will need to be devoted to tilled crops, which may result in a reduction in the soil building crops and thus make it difficult to maintain the productivity of the soil. If, due to a limited acreage that can be tilled, the acreage of each of the tilled crops included in the rotation is so small as to lead to inefficiencies in production, then it probably will be better to reorganize the rotation and include fewer crops that compete for the land. Small grain crops, as wheat and oats, do not generally compete with the tilled crops but fit in as transition crops between the tilled crops and the meadow crops.

Facilities For Storing Crops.—Consideration must also be given to the problem of storage space for the crops to be produced, when working out a crop rotation or deciding between two or more proposed rotations. If a plan is being contemplated which will include a crop that has not been grown to any extent previously, such as a legume meadow from which hay will be made, a distinct problem of storage may arise. Such will be the case unless there is some available barn room that has not been used in the past, or that will be released by the hay displacing some previously used feed such as shredded fodder or timothy hay.

In some cases existing storage space may be more economically used by storing crops in a more compact form, as baled or as chopped hay. These methods, however, may prove to be more costly in the long run than some expansion in barn space. On farms with suitable silos the use of grass silage instead of corn silage may solve all or part of the problem of storing meadow crops. If, after making full use of existing facilities, there still is inadequate space to store an ample supply of good hay to feed the livestock that one may plan to keep, then thought should be given to expanding storage facilities. The desirability of having an ample supply of hay usually will justify the erection of an inexpensive hay barn.

If there still remains a surplus of meadow crops after arranging to store hay for the livestock program, frequently other uses can be made of them than as hay. That will eliminate the need for large amounts of storage and at the same time provide a profitable use—for example, the production of a seed crop or more pasture. On many farms a profitable use is to plow under the surplus meadow growth, and thereby increase the production of other crops

for which there are satisfactory storage facilities and market outlets. In the event that the meadow crop is to be used as a green manure crop it may be desirable to use a different type of legume than when hay is to be made.

In the case of inadequate storage for grain crops, satisfactory temporary structures can be used to minimize the difficulty until more permanent facilities can be erected.

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Planning the Livestock Program

With one or more preliminary crop systems set up, the next step is to consider the livestock program. Before attempting to prepare a livestock system, a review of why one keeps livestock is desirable. After making such a review, if one still decides that the best organization of his resources will include some livestock, then he is ready to develop plans for the livestock enterprise. It may be that not all farmers should include livestock in their organizations, since their resources may be such that good or better organizations can be built without livestock.

Reasons for Including Livestock in the Farm Organization

There are three reasons why one includes livestock in the farm plan: (1) to increase the net income; (2) to assist in maintaining the productivity of the soil; and (3) to provide the family with livestock products.

Livestock may increase the net income of the farm in the following ways. First, by converting otherwise low value and waste products into a salable form. The waste products referred to will vary from farm to farm, and may include such things as pasture that cannot be rented to advantage; roughages that have little or no market value, as corn stover and low grade hay; unsalable grains, such as soft corn and damaged grains; buildings equipped for livestock; a good market outlet for some livestock product or products; and, probably the most important of all, a supply of labor that is not productively employed due either to a small volume of business or to a poor distribution of labor.

A second way by which livestock may increase the income is to change already salable products, such as grain and hay, into a product of greater total value. If this latter method is to increase the net income, obviously the livestock must return more than $1.00 for each dollar's worth of salable product utilized, otherwise the farmer would be as well or better off to sell the salable crops except in so far as the livestock enterprise assisted in maintaining the productivity of the soil.

Some farmers are so limited in their ability to feed and manage livestock, or their farm is so poorly equipped for keeping livestock, or they lack satisfactory markets, or a little of each, that the farm organization likely to give them the best income will contain little or no livestock above that needed to utilize products which would be otherwise wasted. Other farmers with greater knowledge about feeding and management of livestock and with adequate

livestock equipment are able over a period of years to obtain considerably more than $1.00 return for each $1.00 of salable product fed. If such men did not keep livestock they would be wasting a valuable resource, namely, their personal ability to produce livestock and livestock products profitably.

Often the chief reason given by farmers for keeping livestock is that by feeding most of the crops on the farm, less fertility is hauled away. Few question that this is true, but far too often such poor care is taken of the manure that the amount of fertility saved barely pays for the cost of hauling it to the fields. On other farms the type of livestock produced often has encouraged the production of soil depleting crops, such as corn, to the point where the type and size of the livestock enterprise is largely responsible for soil depletion rather than soil maintenance.

Carefully conducted experiments over a long period of years at the Ohio Agricultural Experiment Station indicate that if a non-depleting crop rotation is used, a liberal application of fertilizer made, and all the crop residue plowed under, the grain and seed can be sold and the productivity will be maintained without keeping livestock.[1] It is recognized, however, that such a system is only feasible on land on which little or no erosion takes place. Where erosion is a problem and the land must be kept in sod crops a large part of the time, livestock is essential if these crops are to be efficiently utilized.

Another economic advantage and reason for keeping livestock on the farm arises from the fact that a large part of the income, particularly on small farms, appears in the form of food supplied the family by the farm. If no livestock is kept, either the family consumes no livestock products or must purchase them elsewhere. If they are purchased, usually the cost is much above that for which they could be produced, even if relatively inefficiently produced. In the majority of cases it is of doubtful economy to set up a farm plan that does not provide for sufficient livestock to produce a considerable portion of the livestock products required by the farm family.

The Type and Amounts of Livestock to Keep

If, after reviewing the inventory and the preliminary crop systems that have been drawn up, one concludes that to make the best use of his resources it is essential to include livestock in the organization, then the next step in the process of working out the farm organization is to determine the type and amount of livestock to keep.

Before allocating the available feed to one or more types of livestock, one must first make provisions for feed, pasture, barn space, and labor to cover the needs for farm power in the form of horses, if horses are to be used, and for the livestock that is to be kept exclusively for home consumption. On farms where horses will be kept, one must at least tentatively decide how many will be needed, so that their feed and pasture requirements can be determined and

[1] See Ohio Agricultural Experiment Station Special Circular No. 53, page 92.

deducted when calculating the amount which will be available for other stock. This raises the problem of how much feed must be budgeted for each type of livestock.

Feed Requirements.—In answering the question regarding how much feed will be required by various types of livestock, the experienced farm operator should have little difficulty in making reasonable estimates. There are, however, many operators who will be at a loss to know how to work out their feed program without some guide that is more tangible than their own individual experience. Those farmers who are familiar with the quantities they normally feed to different types of livestock should by all means rely on their own experience.

To assist individual farmers interested in organizing or re-organizing their crop and livestock program who are not familiar with feed requirements, the Rural Economics Department has assembled helpful data on the feed consumed by livestock. These data have been published by the Ohio Agricultural Extension Service in Bulletin 203, "Feed Consumed by Livestock—A Guide for Planning the Farm Organization."

Type and Number of Livestock Required to Utilize the Waste Products Available.—A type or combination of types of livestock should be chosen that will make the best use of the low value and unsalable feeds that will be available such as hay, corn stover, and pasture. Dairy cattle, beef breeding herds, and sheep are the chief roughage and pasture consuming types of livestock. In choosing the type of livestock to use these feeds, one must keep in mind, in addition to the other types of crops produced, the fence and building facilities available, the type of market outlet, capital required, the available labor supply, and one's own experience. One must also take into account the labor distribution and, in so far as possible, select a type or a combination of types that will require the least labor at the time the crops require the most.

The number of head of the various types of livestock to keep may be fairly accurately determined by dividing the amount of feed required per head into the estimated total quantity of feed that will be available. It is unwise, on most farms, to keep an amount of livestock that will fully utilize all of the low value and unsalable feeds that are expected to be available in an average year, since in some years (due to unfavorable weather, insects, and the like) smaller amounts than the average will be produced. If one has planned to keep a sufficient number of animals to use all of the rough feeds and pasture and a poor crop year occurs, either some livestock must be sold at a sacrifice price or feed purchased at a high price. Rough feeds, such as hay, corn stover, and pasture are usually difficult to obtain locally in periods of poor crops, and if shipped any distance the cost of these feeds becomes prohibitive.

Type and Number of Livestock to be Kept to Consume Salable Products.—When a type or combination of types of livestock have been selected to utilize the low value and unsalable feeds, and the quantity to be kept determined,

there will probably be a surplus of salable crops such as corn and oats still on hand. The type of livestock chosen to use the rough feeds usually does not require large quantities of concentrates. The one exception is the dairy enterprise.

If one believes that he is sufficiently skilled as a feeder to increase his income by feeding the salable crops rather than selling them, and has the facilities, capital, and labor, then one will follow much the same process of reasoning in determining the type or types and the number of grain consuming livestock to keep as was followed in the case of the roughage and pasture consuming animals. Some of the concentrate consuming animals (hogs, beef feeder cattle, lambs, and poultry) require some dry roughage or pasture or both in addition to concentrates. It may be necessary to make some reduction in the number of roughage and pasture consuming animals already decided upon in order that a sufficient quantity of dry roughage and pasture be available to feed properly the grain consuming livestock.

Adjust Crop and Livestock Plans to Obtain Best Possible Balance Between Feed Produced and Feed Required.—The total feed required by the various types and amount of livestock tentatively selected may require more of some type of feed and less of another than will be produced by the contemplated crop plan. It is at this stage in the process of developing the farm organization that mutual adjustments between the crop and livestock program must be made if the two are to mesh well together, which is so essential in all satisfactory farm organizations.

Usually the adjustments can be made by shifting more hay to pasture or pasture to hay, by selling one type of grain and purchasing another, by increasing or decreasing the number of one or more types of livestock, or by completely eliminating some type of livestock. In case of wide differences it may be necessary to draft an entirely new crop or livestock program, or both. If it is necessary to draw up a new crop program, extreme care must be taken to see that in re-drafting the crop plan one does not set up a plan that runs against the natural adaptation of the land and that it will not deplete the productivity of the soil. If to produce crops of the kind and in sufficient amount required to feed the livestock included in the proposed set-up, it becomes necessary to grow crops to which the land is not suited and that cannot be produced economically, then it is highly probable that the livestock program needs to be replanned.

It must be recognized that in almost any crop and livestock combination one will need to buy some supplementary feeds to balance the rations properly.

Expansion of the Livestock Program Beyond Capacity of the Farm to Provide Feed.—On farms where the acreage of land available for crop production is small or the yielding capacity low, or both, and the total quantity of crops that can be produced without depleting the productive capacity of the soil is small, obviously, the quantity of livestock that can be kept will also be

small unless feeds in addition to the usual protein supplements are purchased. If the quantity of crops that can be grown and livestock that can be kept without purchasing additional grain or hay are so small that the available labor supply is not completely utilized, then it may be advisable to consider a livestock program that will necessitate purchase of feeds in addition to the usual purchased supplements, thus making it possible to utilize the available labor.

It should be remembered that one must have considerable skill in feeding and managing livestock and a good market outlet to justify the purchase of extra feed grain, since purchased corn, oats, hay and the like are higher priced than home grown feeds, due to marketing and transportation costs. If one's ability to feed livestock and his market outlet are not above average, the farm income produced by an organization which necessitates the purchase of large quantities of grain and hay, may be no greater and in many cases less than an organization which fails to use all of the labor.

In the case of small farms where the ability of the management and the market outlets make it desirable to set up a livestock program that will utilize surplus labor, dairying and poultry offer the best opportunity, as both enterprises require large amounts of man labor. On farms of this type it is often desirable to plan a crop program that will produce all of the dry roughage and pasture required by the livestock program, as these feeds are the most difficult to obtain at reasonable prices if they must be purchased. If, after using as much of the crop land for hay and pasture as needed to carry the livestock, there is still some land that can be used for grain crops, they should be limited, in so far as possible, to those producing large quantities of concentrates per acre. Under such conditions corn should be given preference over oats, since it produces much larger quantities of digestible nutrients per acre.

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Planning to Get the Work Done

The stage in the development of a plan has now been arrived at where it is necessary to determine how to get the work done that will be involved in carrying out the proposed crop and livestock systems. If both systems are included in the organization, they must provide ample productive work, reasonably well distributed throughout the year, to keep the existing labor supply productively employed. In addition they must make good use of the land, buildings, equipment, power, markets, and the like, if anything approaching the most profitable organization is to be realized.

Equipment and Power Needed to Put Plan Into Operation

The determination of the labor involved in the crop program calls for information regarding the power and equipment that will be used. This in turn is determined in part by the capital available for operations. The less man

labor available for the job that must be done, the more desirable and necessary it is to use large units of machinery and power per man. The larger the supply of operator and family labor to be employed in relation to the size of the task, the less essential large units of machinery and power become.

If capital is very scarce, the equipment and the forms of power that call for the smallest outlay of capital are desirable, even though more man labor and time will be required to do the work. Where capital does not necessarily restrict the size and kind of equipment and power, the decision as to kind, size, etc., to be used will be determined by other factors such as the influence the choice may have on the labor distribution, displacement of labor, and actual costs of operation.

Type and Size of Equipment.—If one has not already acquired equipment and operated the farm for which the plan is being prepared, a logical place to start is to determine the type of work to be performed, the size of each job, and the number of days in which the task must normally be done. A list of different types of work may readily be prepared by recording the various operations performed for each crop. Some of the tasks, such as fitting the ground, utilize the same equipment. By taking note of the tasks that can be performed with the same machine and the acreage of each operation, one can determine the acres that must be plowed or double disked, planted, sowed, harvested, etc., each year.

In determining the number of days one can plow land in the spring, plant corn, cut wheat, sow wheat, etc., one will need to rely on past experience. Since weather conditions in the less favorable seasons must be met, usually the time available for doing many of the tasks is small. After compiling information of this type, one is in a position to proceed with the selection of equipment and power, since from such a list one can determine the type and size of machine and the type and amount of power that will be needed to do the job.

Some of the tasks to be performed can be done by hand if the amount to be done is small or capital scarce, such as cutting and husking corn. Some tasks may be done by hiring a custom operator such as a stationary thresher, combined harvester-thresher, ensilage cutter, corn picker, corn shredder, potato sprayer, and the like. A few tasks may call for machines that can be owned in partnership, while others should be owned individually if the task is to be carried out at the optimum time, since these tasks usually must be performed at the same time on all farms in the neighborhood.

The size of the individual machine to purchase will largely be determined by the time available in which the work must be done, the acres to be covered, the sizes of machines that are manufactured, and the type of power used. If one has 35 acres of land to be plowed for corn and his experience tells him that in years when weather conditions are unfavorable it is not safe to count on more than 15 days of favorable weather and soil conditions for plowing, then he must plan to have plowing equipment adequate to do the job in the

time that will be available in the least favorable years. If the crop program includes 80 acres of wheat, a 6-foot, 2-horse grain drill might be ample to seed the wheat, if there was no time lost due to bad weather. But to be fairly certain of getting the task done at the right time, the smallest drill that one should buy would be a 7-foot, 3-horse drill.

Some farms with small acreages to be covered must use machines, the smallest efficient unit of which provides capacity greatly in excess of needs. In such cases, it is desirable, wherever possible, that two or more neighbors own such machines in partnership.

Amount and Type of Power.—The amount of power may be arrived at by using the data compiled to show the type of work to be performed, the size of each job, and the time available to do the work, together with the number of power consuming operations that may be in progress at the same time. For instance, if one has such a large acreage to plant that some of the ground must be fitted at the same time that some of it is being planted, then it will require two units of power, one to draw the planter and one to draw the fitting tools. If the fitting requires four horses or their equivalent, then either six horses; two horses and a tractor; or a large tractor and a small tractor capable of adapting itself to planting corn will be needed. If the farm is small and the acreage to be planted is such that it is possible to prepare part of the ground and plant it before preparing another part, the amount of power needed will be determined by the operation that calls for the most power. This might be three horses, if a small double disk harrow is used, or one small tractor adapted to either planting or disking.

The maximum amount of power needed to operate the farm will be that amount which is required to do the work satisfactorily at the time of year when the most power will be used in carrying out the proposed crop and livestock plan.

Whether one shall use horses entirely, or tractor power only, or a combination of horse and tractor power depends on many things. Each farmer must arrive at his own answer, because it is an individual problem; and in arriving at his answer, if it is to be the logical one, the following things should be given consideration:

1. The amount of work to be performed in relation to the time and labor supply available.
2. The kind of work to be performed and the type of power required to do it.
3. A change in type of power may call for the displacement of equipment now on hand by new specialized equipment.
4. The available capital and the amount required by different types of power.
5. The urgency of demand for capital in other phases of the organization such as the need for lime, fertilizer, better livestock, and the like.

6. The effect that different types of power will have on the distribution of labor.
7. The effect that the resulting improvement in distribution of labor will have on the labor required.
8. The use that can be made of man labor that may be displaced by a change in the type or amount of power, or both.
9. The influence that a shift in type or amount of power will have on crop yields.
10. The influence that a change in type or amount of power will have on the feed supply and building space available for livestock and other needs.
11. The smallest practical size tractor and tractor equipment, together with a team (if the horses are considered necessary) may provide a great excess of power.
12. The number of horses that can be displaced if tractor power is added.

In deciding on whether to purchase a new unit of equipment or power, a good guide to follow is to determine whether it will result in an actual cash saving in operating expenses or in an actual increase in cash income, thus providing the money to repay the investment. The one exception to this is where one wishes to have more leisure time and is willing, if necessary, to take a smaller income. Frequently, a new machine or unit of power results in the saving of labor which cannot be converted into actual cash, as it is either family labor that cannot be reduced, or hired labor that cannot be discharged because the amount of labor saved is not great enough to permit a reduction in the amount of hired labor employed. In such cases the only means of converting the released labor into actual cash is to re-employ it, either by more intensive care of already existing enterprises; by expanding an enterprise; or by adding a new one.

Facilities for Storing Equipment.—A frequently ignored factor, but one that should be taken into account when debating the economy of purchasing a unit of equipment, is the facilities for storage. Shelter for one's equipment has always been desirable, but formerly, when equipment was less complicated and all that was necessary in many cases was to paint a few of the important parts with some old machine oil and to put the tongue in the barn, storage was less essential. This situation is no longer true, as much of the equipment is of the type that undue exposure to the elements greatly lessens its usefulness and shortens its life.

Man Labor Needed to Put the Plan Into Operation

When one has tentatively selected the type and size of equipment and a type and amount of power needed, he is then in position to proceed to determine the amount of labor that will be required for the different crop systems under consideration.

Man Labor Required to Produce Crops.—A farmer who has operated a farm with his present power and equipment usually knows fairly accurately how much work he can accomplish in a 10-hour day, and he knows what operations he normally performs on each crop. The things that he does not know are what specific operations will need to be performed each year, or how many times, due to the unpredictable character of the weather and the effect that the weather will have on soil and crop conditions. However, if he has farmed for any length of time he will have a fair idea of what the maximum number of operations are likely to be even in unfavorable years. With this knowledge he can quite accurately determine the maximum labor requirements for the different crops, by computing the number of hours that will be required to perform each operation involved in producing the crops included in the rotation with the power and equipment which he has or will obtain.

The Rural Economics Department has assembled data on the average amount of work done in a 10-hour day and the labor required for crop production in Ohio[1] for use in determining the amount of labor required for crops.

The data contained in these two bulletins are based on the average accomplishments of a large number of farmers. Some of the farmers accomplished considerably more and some less than the average. For the farmer who organizes and plans his work carefully and is skilled in the various tasks, the average requirement as reported in these bulletins will be too high. On the other hand, some may need to plan on more time. In addition to the skill of the operator, the field size, arrangement, shape, and distance from the farmstead will increase or decrease the amount of labor required.

Man Labor Required to Care for Livestock.—A fair idea as to the total time required to care for an already existing livestock system may be obtained by estimating the average amount of time spent each day in caring for it. If the new plan calls for minor changes only, the experienced operator will be able to fairly accurately predict their effects on the labor requirement. In case a major change in type and amount of livestock is to be made or an entirely new program is to be installed, a more difficult problem of determining the labor requirements presents itself. Few farmers, except those who have kept very detailed records, are familiar with the number of hours required to care for the different types of livestock, and will need to rely to a considerable degree on data assembled on farms where such records have been kept.

In Ohio and neighboring states, studies have been made to determine the amount and distribution of labor expended in the care of livestock.[2] These data may be used as a guide in determining the total hours required to care for livestock on the individual farm by adapting it to the situation. It must

[1] "The Average Amount of Work Done in a 10-Hour Day," Rural Econ. Dept., Ohio State University, Mimeograph Bulletin 32. "Labor Required for Crop Production in Ohio," Rural Econ. Dept., Ohio State University, Mimeograph Bulletin 115.

[2] Information regarding labor required to care for different types of livestock may be obtained by writing to the Rural Economics Department of Ohio State University.

be adjusted to the individual farm, because the time required as shown by these studies is the average of several farms of similar character. Some farmers required more than the average time to do the work and others less, due to the skill of the labor and management, building arrangement, watering and feeding facilities, and the like.

Man Labor Required to Do the Maintenance and Miscellaneous Work.—On every farm there is, in addition to the labor on crops and livestock, a considerable amount of necessary work that does not fall in either classification, such as maintenance work on land, buildings, fences, machinery, and other work such as mowing weeds and hauling manure. Maintenance and miscellaneous labor on cost account farms ranged from 20 to 30 per cent of the total; on most farms, closer to 25 per cent, and in a few very inefficient cases as much as 35 per cent of the time was devoted to this type of work.

In estimating the amount of maintenance and miscellaneous work to be done, one must consider the effect of the following factors: (a) The convenience of the farm and building arrangement; (b) the condition of buildings, fences, machinery, etc.; (c) the condition of the drainage and water systems; (d) the amount of lanes, roads, etc.; and (e) the amount of manure produced and the distance it must be hauled. Less time will be required for maintenance labor if the farm is so arranged that there is a minimum of fence and gates to keep in repair and fence rows to mow, and when the buildings, machinery, fence, and the like are already in average or better condition.

If it seems to you that your farm is only average in respect to these things and that you normally have a rather large amount of work of this type to do, it is probable that maintenance and miscellaneous labor will make up approximately 25 per cent of the total work to be done. Assuming this to be the case, then the crop and livestock labor will make up 75 per cent of the total. Assuming that one had previously found that it will require 3000 hours to care for the crops and livestock, the time required to do the maintenance and miscellaneous work will be 1000 hours, thus making a total of 4000 hours for the entire proposed organization per year. One must bear in mind that this total includes several estimates and can only be used as a guide, yet if one has been careful in appraising his individual condition it will be sufficiently accurate as a measure of the labor requirements of a proposed organization.

A Comparison of the Total Labor Required With the Available Labor Supply.—A comparison of the total number of days that has been computed to be necessary to operate the entire farm with the total amount of labor available on the farm will indicate, in a general way, whether the proposed program will provide sufficient work for most of the available labor, or whether there will be more work than the available labor can do. If the total hours required is greater than those available, obviously additional labor will be needed unless the available labor supply works longer hours or unless more efficient ways are developed for doing the work.

On the other hand, if the proposed plan does not come somewhat near employing all of the available labor, it may be necessary to make some changes in the proposed plan whereby enterprises employing more labor are included. Otherwise, one will probably not be making the best use of all resources, particularly labor. Even though the total labor required is no greater or perhaps a little less than the total supply available, there still is a question as to whether the proposed plan can be handled by the present labor supply. Until one knows how the work will be distributed throughout the year, it will be impossible to be sure how much labor will be needed. This brings one to the problem of determining when the various tasks must normally be performed during the year.

Distribution of Labor Required for Crops, Livestock, and Miscellaneous Work.—Most farmers, after a few minutes of thought, can block out on a calendar the periods when labor will be in most demand during the year. A farmer will be in a better position to do this than an outsider, particularly if the proposed plan involves crops and livestock enterprises with which he is familiar. Each farmer knows fairly accurately the normal dates when the various tasks involved in producing and harvesting crops are performed, when his sows will farrow, when his ewes will lamb, when he starts his baby chicks, and the like. If one prepares a form dividing each month into 10-day or half-month periods, he can distribute the hours of labor that are required to grow the various crops and care for each livestock enterprise. He should enter the hours on the form at the approximate time these operations are normally performed. This will give him a fairly accurate picture of the distribution of labor involved in crop and livestock production.

Data that can be used as guides for distributing crop and livestock labor are available. Such data, however, must be adapted to the farmer's own conditions, as the time when different tasks are performed—such as planting and harvesting—differs with location, and the dates when sows farrow, ewes lamb, chicks are started, etc., vary from farm to farm. Thus each farmer must analyze his own situation rather carefully when working out a labor distribution.

After distributing the labor involved in caring for the proposed crop and livestock program, the labor needed to do the maintenance and miscellaneous work must be considered. Most of the tasks of a maintenance and miscellaneous character are flexible to a reasonable degree as to when they may be performed. Some few must be done whenever the task arises, such as repairing fence to keep livestock out of the crops or fixing the pump when it breaks. Others, as mowing weeds, hauling manure, building new fence, and the like, can be moved about to fit into those periods when one is not working on crops or livestock.

This being the case, one need not concern himself as much with a detailed distribution of the miscellaneous and maintenance labor as with that of the labor on crops and livestock. However, it must be kept in mind that there

is always some maintenance labor that must be performed each month. Not all of it can be done during the winter; thus caution must be taken to see that there is some time available each month above that required to care for the crops and livestock, otherwise one will not have sufficient labor to do all of the work.

Adjust Plan to Obtain a Better Balance Between Labor Available and Labor Required

If, on completing the distribution of labor, there appears to be a discrepancy between the amount of labor required at certain periods and the amount available, one must analyze the situation to see if some adjustments can be made to remove the difficulty. One must recognize that it will be extremely difficult, if not impossible, to work out a farm organization that will require a uniform amount of labor each 10-day period throughout the year. In almost every program there will be some peak periods and some periods when there will not be enough productive work to keep all of the available labor employed. The elimination of serious labor peaks and a reasonably uniform distribution of labor throughout the year should be the major objective.

If the discrepancy between the demand for and supply of labor is too great, it may be necessary to rework the proposed plan in order that a better adjustment be achieved. When the demand for labor greatly exceeds the supply for short periods, as it does on many farms during the hay and small grain harvest, and during the corn cutting and husking season, the hiring of extra labor is often the only alternative. In some instances the use of larger units of equipment and more power will satisfactorily cope with the situation. It is frequently possible to relieve the pressure on the labor supply by substituting the use of combines, corn binders, corn pickers, etc., for less rapid methods which involve much more man labor. Whether or not such equipment should be owned or hired by the farmer must be determined by factors previously discussed.

A more indirect but no less effective means of reducing the peak labor problem is to increase one's efficiency by improving the shape, size, and arrangements of fields and by improving the facilities for caring for livestock. The latter method is very effective on farms where a considerable amount of time is required each day during the crop season to care for livestock.

If the proposed plan does not provide sufficient work for the available labor, or provides too much for the operator and his family but not enough for a full time hired man, there are several things that one can do to increase the amount of productive work. For example, it is often possible to spend more time in caring for the present crops and livestock program and thus increasing somewhat their production. By improving the productive capacity of crop land and the carrying capacity of pasture through the use of lime, more fertilizer, better seed, improved cultural methods, etc., one may increase crop production and thereby increase the size of the livestock enterprise. Good livestock feeders may increase the productive labor by expanding their livestock program and

purchasing feed grains in addition to protein supplements. If the difference between the labor supply and that required by the proposed plan is great, some reorganization of the plan to include more intensive enterprises such as small fruits, potatoes, tobacco, sugar beets, a canning crop, etc., and more intensive types of livestock such as dairy and poultry in place of hogs, beef cattle, and sheep, may need to be done.

When one has completed the calculation of the amount and distribution of the labor that will be required, and made the adjustments that seem necessary so that the proposed organization will make good use of the labor as well as the other resources, then one is ready to examine his plan (or plans, if more than one has been developed), to determine which offers the greater income producing possibilities.

Determining the Probable Receipts, Expenses, and Income

Time Required to Bring Proposed Plan to Full Productivity

When one is ready to analyze the income producing possibilities of a proposed plan, it is necessary to keep in mind that time will be required to put the new farm organization into operation. Even minor changes in an old organization may require a year or more before the effect of the change appears in the receipt column of the account book. In most cases, the greater the change in the organization, the longer the time required to bring it to its full productive level.

For instance, if one of the proposed changes is to include a mixed alfalfa-clover-timothy meadow in the rotation in place of a timothy and alsike meadow, it is doubtful if the full effects of the change on crop yields and the livestock program will be realized before two or three complete rounds of the new rotation have passed. If an application of lime and increased amounts of fertilizer are needed to put the new rotation into operation, and these are applied, there will probably be some immediate increase in crop yields as a result, but one cannot expect any improvement in yields from the better legume meadow until after an alfalfa and clover sod has been turned under.

Likewise, one must not expect to obtain a perfect stand of mixed alfalfa-clover-timothy the first rotation, as some time is usually required to put land into condition to grow legumes unless they have been successfully produced before. One may also experience unfavorable weather or other unsatisfactory conditions that will delay the establishment of a good legume meadow on one or more of the fields during a rotation. Since time will be required to establish a new rotation and for crop yields to respond, it probably will not be possible to bring the proposed livestock program to the full size planned until crop yields reach the level of production which was estimated.

If income producing capacity of the proposed plan is to be accurately appraised it will be necessary to calculate the probable receipts and expenses.

Such calculation will need to be based upon the quantity of the various farm products that will be produced for sale and the goods and services that will have to be purchased at the time the plan is in full operation. When one has computed the income producing capacity on this basis, it must be remembered that the actual income the first year, or possibly for several years, may not reach this level unless the immediate prices and yields are more favorable than the long time average prices and yields used in determining the average annual expected income.

If one is to estimate with any degree of accuracy the probable receipts, expenses, and income, he must have worked out most of the previous steps outlined in the earlier sections of this bulletin, since much of the information needed will be obtained from these earlier calculations. One will also need the long-time average of prices for the various commodities that will be purchased and sold. The use of long-time average prices is necessary if one is to eliminate the effect of price fluctuations on income that are due to yearly variations in supply and demand. Otherwise, when comparing the income from two or more plans, a temporarily high or low price for some commodity during one year might unduly favor one plan and discriminate against another, and the reverse might be true the next year.

Long-time Average of Prices Used in Determining Income

The average of prices should, if possible, cover a 10-year period. A few farmers may have a 10-year average of local prices; however, most farmers will need to obtain this data from other sources.[1] After obtaining such a list, a little adjustment in some of the individual prices may be desirable when one is fairly certain that changes will occur as a result of present and future trends and outlook.

When computing the probable receipts and expenses, it will be desirable to set down as accurately as possible the months in which the products will be sold and the major expenditures made, in order to be able to plan one's finances so that funds will be available to meet the demands when they arise.

Computing the Average Annual Receipts Expected From the Organization When Fully Established

Crop Receipts.—The quantity of each crop available for sale will be the difference between the estimated average annual production and the quantity needed for feed and seed. If estimates of production and needs are reasonably correct, all of the remainder can be considered as available for sale, but it is wise to leave a small quantity as an insurance against short crop years and

[1] The local grain elevator, feed store, fertilizer dealer, hardware and implement company, livestock co-ops, or private buyers, etc., may be called on for this type of information. The Rural Economics Department at the Ohio State University will supply 10-year state average prices on request.

probable errors in estimations. The amount to be left as an emergency surplus must be decided by each individual. After a few years of operation under the new program one will know more about how accurate are his estimates on crop production and livestock feed requirements, and he will be better able to determine how much can be sold.

Livestock Receipts.—In arriving at the quantity of livestock and livestock products that will be for sale, provisions must be made for replacement stock in order that the various enterprises be maintained on a uniform production basis. Heifers, gilts, and ewe lambs must be held over each year to replace the breeding animals that die or are sold; otherwise it will be necessary to purchase replacement animals. One must also make allowance for family consumption. After making provision for replacements of breeding stock, milk for calves, and products needed for family consumption, the remaining animals and products may be considered as available for sale. The total quantity produced may be obtained from the data compiled when planning the livestock system. For instance, if one at present has or plans to have dairy cows that will produce 6,000 pounds of 4 to 5 per cent milk each per year, plans were presumably made for sufficient feed to produce this quantity of milk per cow when the livestock system was developed.

If hogs are included in the organization, the amount of feed required was budgeted to cover the production of a specified number of market hogs of a given weight. The number was arrived at by multiplying the number of sows kept by the number of pigs per sow that you normally raise to market weight. The number of pigs raised to market weight per sow bred to farrow two litters per year varies greatly from farm to farm. Where proper feeding methods are followed, where care is taken to minimize disease and parasite loss, and where good quality breeding animals are kept, the number of pigs raised to market weight per sow per year may average as high as 14. The average for a large group of western Ohio farms is 11.8 pigs per sow per year. The weight at which hogs are marketed differs greatly, and each farmer must determine the weight at which he can most profitably market his hogs. If the hogs have been on continuous full feed, market weights of 205 to 225 lbs. usually bring the best prices.

In the case of poultry, the expected egg production per hen per year multiplied by the number in the flock, less eggs needed for hatching and family use, will be the quantity available for sale. Egg production per hen will depend on the type of management and inherited producing capacity. If only minimum care and feed are provided, the average annual production may not exceed 6 dozen per hen. Excellent care and feeding often results in a production of 12 or more dozen per hen, and average care and feeding generally results in 9 to 10 dozen. The quantity of poultry products for sale can be determined by deducting the estimated quantity of poultry used by the family from the number produced each year after allowing for replacements and mortality.

The quantity of other livestock and livestock products available for sale may be determined in the same way.

Miscellaneous Receipts.—Usually there are a few dollars obtained annually from such sources as outside labor, custom work, breeding fees, house rent, gas and oil leases, etc. If there is any degree of regularity and certainty that receipts will occur annually from these sources, provisions should be made to include them when calculating total expected receipts.

In recent years an important source of income on many farms that may be considered under the heading of miscellaneous receipts, is the payment received for compliance with the agricultural conservation program. It may not be desirable, however, to set it up as a part of expected long time average annual receipts, since the amount and permanency of the payment is still somewhat of an unknown quantity. However, it is not sound management to ignore it when weighing the income producing capacities of two or more farm plans.

Computing the Average Annual Expenditures Incurred in the Operation of the Organization When It Is Fully Established

Hired Labor.—Many farmers are able to build a farm organization out of the resources at their disposal that the family can operate without hiring any additional labor. In such cases there is no task to determining the amount of the annual labor bill, but on other farms the organization will call for some hired labor, either regular, or by the day during the peak periods. By referring to the data on labor requirements and distribution in relationship to the available supply, one can determine the months of regular hired labor or the days of extra hired labor, or both, that will be needed. The cash wage rate will vary with the length and regularity of the employment and the facilities supplied the labor. It is desirable to use local wage rates whenever possible in calculating the average annual labor cost.

Purchased Feeds.—On almost every farm there will be some feed to be purchased, particularly protein feed and minerals to supplement home grown feeds. The quantity of these feeds to be purchased can be ascertained by referring to the summary of the feed budget. The individual feed prices used in determining the average annual cost should, if possible, be the average of a 10-year period, otherwise the price may be unduly influenced by periods of high or low prices.

Purchased Seeds.—A part of the seed requirements will be filled from home produced seeds; others will need to be purchased. The quantities which must be purchased may be easily determined by drawing on one's own experience for seeding rates. If some change in seeding rates or kinds make up a part of the new plan, information on recommended seed mixtures and rates of application may be obtained by contacting the county agricultural agent or the Agronomy Department at the Ohio State University.

Fertilizer and Lime.—The annual fertilizer applications considered necessary for the effective carrying out of the proposed crop plan should be used when computing the average yearly fertilizer bill, since the estimated crop production has been based on the use of this amount of fertilizer.

If one's farm is in an area where periodic application of lime must be made to keep the soil sufficiently alkaline to grow legumes, then an annual charge must be made for lime. After one has applied sufficient lime to raise the calcium content to the point where the desired legume can be successfully grown, it will be necessary to make an application of lime approximately every 10 years. This being the case, one should charge against each year's receipts enough to cover the cost of re-liming one-tenth of the land each year.

Taxes and Insurance.—The uncertainty involved in predicting the amount of future taxes is so great that it is safer to use present rates than to attempt to predict future ones. Present taxes and insurance costs are not difficult to determine. Real estate taxes usually change slowly and the type of farm organization used will have almost no effect on them. Farm personal taxes will vary somewhat with the type of farming followed and the price level, but by calculating the average value of the various classes of taxable property that will be on hand on tax listing day, the average amount of these can be predetermined with reasonable accuracy. In the case of insurance there may be some variation in annual cost, but by averaging the past four or five years one can overcome this difficulty.

Veterinary Services.—The average yearly cost for veterinary services will differ materially between farms and by types of farming. On farms where hogs are a major enterprise, immunization against hog cholera, etc., materially affects the annual cost of veterinary service. Dairy cattle more often require the service of the veterinarian than do beef cattle or sheep, and in recent years poultry diseases and their prevention has tended to increase the cost of such services on many farms. Unless one has some record of these costs in the form of a memorandum, cancelled checks, farm account books, or access to the books of the local veterinarian to use as a guide, it will be necessary to estimate such costs. These may be reasonably well determined by taking into account the kind and amount of livestock to be kept, and by inquiring of the veterinary as to the cost of various types of services.

Machine Hire.—Included in this category are threshing, combining, shredding, baling, silo filling, corn picking, and any other machine work that one plans to hire. Usually the rates for machine hire are fairly well established in each community. The average number of bushels to be threshed, acres of grain to be combined, corn to be picked, silos to be filled, and the like, can be ascertained by referring to the proposed crop plan and to the data worked out on the method of getting the work done.

Fuel and Oil for Farm Work.—The quantity required will vary materially with the type of crop rotation and the methods used. On farms where a large

part of the work is done with tractor power the fuel cost will be one of the major expense items. The approximate number of hours that the tractor will be used during a year can be computed by referring to the information assembled when analyzing the problems of getting the work done. The number of hours that the tractor is expected to be in operation times the average hourly fuel and oil consumption, plus any fuel and oil used for other motors on the farm, will give the total amount needed; when multiplied by the rate per unit this will provide one with a fair idea of fuel and oil costs. Fuel used by the family automobile or in the household should not be included. Provision for including the cost of the use of the automobile that is chargeable to farm operations is discussed under the heading of transportation.

Repairs, Improvements, and Replacements.—In approaching this problem one must keep in mind the goal sought in planning a farm organization, namely, maximum continuous income. As was pointed out earlier, if the income producing ability of the farm is to be maintained throughout the coming years, it will be necessary to maintain one's resources, otherwise the net income producing ability will decline as one's resources deteriorate.

Plans for maintaining the soil were made when the land utilization and crop programs were drawn up. Labor requirements for maintenance and miscellaneous work have also been taken into account. It is now necessary to plan for the annual or periodical expenditure of a sufficient amount of money to maintain machinery, fences, buildings, drainage and water systems, and the like. Except for emergency repairs, it is often possible to delay making many expenditures necessary for maintenance without any noticeable effect on the income producing ability of the farm. It must, however, be recognized that these resources will eventually deteriorate to the point where net income will be adversely affected if expenditures for repairs, improvements, and replacements are indefinitely delayed. When that stage is reached, either the income will fall off rapidly or a large expenditure for improvements and replacements will be necessary.

It is a debatable question as to whether one should spend a sufficient sum each year or delay until income is actually beginning to be influenced before spending any money in maintenance and replacement. It is more certain, however, that funds will be available to meet the cost if some repairs, improvements, and replacements are currently made each year. On many farms the need for improvements and replacements of machinery, etc., occurs irregularly. There may be a period of several years when little or no machinery or equipment need be purchased, but at the end of that period several units may need to be replaced in the same year, thus costs will be very high for a year or two. To meet this, one must make in addition to the charge for current repairs and improvements an average charge each year sufficiently large to cover the annual depreciation cost.

Regardless of the procedure followed in keeping one's resources from deteriorating, it will be necessary to make an average annual deduction from

income sufficient to cover these costs, otherwise the income figure will not truly represent the continuous income producing capacity of the farm.

The amount of the deduction to be made will vary greatly between farms due to the difference in the present state of repair, type and amount of buildings, machinery, annual usage of machinery and power, amount of fence, the type and condition of the drainage and water systems, the amount of farm lanes to be graveled, etc. Some variation will result from differences in the ability of individual farmers to make repairs, care for and operate various types of equipment. Some farmers get double the service out of a piece of equipment that others do. Obviously, each farmer must make his own estimate of these costs. Individual farm records of any type that will show the amount of money expended in the past will be of great assistance in estimating the annual cost. The following are a few guides, but these must be adapted to your own situation before they can be safely used.

In case of buildings, the necessary average annual cost for repairs, improvements, and replacements above that provided by the ordinary farm labor, according to detailed cost account studies, amounts to about 2½ per cent of the replacement cost of the buildings.[1] The annual cost for a few exceptionally well built brick or stone buildings with slate roofs may be computed at a rate of 2 per cent or lower; while others with little or no foundation, light frame construction, and paper roofs will cost 3 per cent or more each year to repair, maintain, and replace.

A fairly accurate estimate of annual fence costs is possible by applying to the total roddage of fence an annual cost per rod based on what it costs to build a rod of good fence and the number of years that it will last. Detailed cost studies show that the life of fence varies from 12 to 20 years, and that average annual costs for repair, improvement, and replacement vary from 5 to 7 cents per rod.

General farm account records kept by Ohio farmers, and detailed cost records both in Ohio and other states indicate that the average annual cost for repairs, improvements, and replacements of farm machinery, including motor power, exclusive of interest, amounts to 15 to 18 per cent of their total current inventory value (not replacement costs). Of the total annual cost, a little more than one-fourth is required for repairs and the remainder for improvements and replacements.

Livestock Purchases.—On most farms the livestock purchased is primarily made up of breeding and work animals needed to maintain their herds and flocks. A few farmers, usually the larger operators, occasionally purchase some feeder cattle, lambs, or pigs, and others buy animals to feed each year. One can determine the number of head of either breeding or feeding animals or both

[1] Replacement cost is the cost of constructing new buildings equal in size to the present buildings and equal in quality to them when new. The replacement cost will generally be much higher than the value that can be obtained for them if the farm were sold, but they represent what it would cost to build today.

that will need to be purchased each year by examining the proposed livestock program. If fairly large flocks or herds are kept, some breeding animals will need to be replaced every year, but bulls, rams, and boars are only replaced every few years and their cost will need to be distributed uniformly over the entire period of their normal usefulness.

Transportation.—There is more or less travel in the family automobile to and from market, trade centers and to neighbors, etc., on farm business. Likewise, there is usually some use made of commercial haulers for transporting products to and from the farm. These costs are a part of the operation of the farm. However, the total cost of operating the family automobile should not be considered as a farm expense, as only part of its use is for farm operating purposes. The amount to charge against the farm for the use of the family automobile can be determined by estimating the number of miles the car is driven annually on farm business and applying a rate of 4 or 5 cents per mile to this mileage.

Other Farm Expenses.—On all farms, numerous minor items of expense will be incurred that have not been considered in detail. Not all of them will occur on every farm, but on every farm there will be some expenses in addition to those already discussed in this bulletin, that must be included. A few of these items are—horseshoeing, sheep shearing, twine, breeding fees, registration fees, spray materials, advertising cost, crates, sacks, boxes, telephone, electricity, and the like. Where expenses of this type will be incurred either regularly or irregularly by the type of farm organization being considered, the average annual expense must be determined and the amount deducted along with the other expenses.

Computing the Average Annual Farm Income

After computing the estimated average annual receipts and expenses, the difference between the two will be the average annual farm income. If one wishes to compare the income producing capacities of two or three possible plans of farm organization with each other and with the plan that is now being used, it will be necessary to compute the average annual receipts, expenses, and income for each. One must use the same method as outlined above, namely, long time average production and prices, otherwise the plans will not be comparable.

Revisions and Adjustments Deemed Desirable in Light of the Income Producing Ability of the Plan

After applying the income test, one may find that the potential income is not as high as his present plan has averaged over the past 10 years. Or if one has not operated the farm before and does not know what the income should be, but he finds that on testing his proposed organization it will yield an income below his present needs, then the next step is to re-examine the plan.

First, a review should be made of the available resources to see if one has failed to fully use any of them in the plan tested.

Second, an examination should be made of one's crop plan to see if he can substitute some intensive crop such as potatoes, canning tomatoes, alfalfa, sugar beets, or the like for some less profitable crop such as oats, timothy hay, etc. Likewise the livestock system should be examined to see if one can replace to advantage beef or sheep with a more intensive type of livestock such as dairy and poultry.

Third, an analysis of the proposed management methods should be made to see if one cannot eliminate some inefficiencies. Perhaps one should feed a better balanced ration to his livestock. Perhaps the livestock is of poor quality and some higher producing animals would make better use of the buildings, feed, and labor. Perhaps one has been using a poorly adapted variety of seed when some other variety would increase the crop yields. Perhaps one could use his labor and power better, if he replaced some small units of machinery with larger units such as substituting a 2-row corn cultivator for two 1-row cultivators, or some other similar change.

Fourth, a re-examination of one's soil maintenance program is desirable to see if it will be possible to maintain the soil without reducing the livestock carrying power of the farm. For instance, instead of using a soil building crop such as mixed timothy and clover, or clover alone, one might use more lime and fertilizer and substitute in their place, in so far as possible, alfalfa and sweet clover.

After all economies and adjustments have been made, if the income is still insufficient, the following possibilities remain:

1. One may buy or rent more land and thereby make it possible to further expand the volume of business.

2. One may, if a good livestock man, buy feed and keep more livestock than the land will produce crops for and thus further expand the volume of business.

3. One may, as a last resort, find it necessary to use a type of organization, at least for a time, that does not maintain the resources. This procedure is questionable and may indicate that the land should be used for some other purpose than farming.

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Placing the New Organization Into Operation

When one has developed the organization which he believes has the greatest continuous income producing possibilities, there remains the task of planning the procedure for getting the new organization into operation. The first step is to find out the differences that exist between the present situation on the farm and the situation as it will be when the new organization has been completely installed. By observing the differences when the two are compared,

one can note the changes needed and list those things that will need to be done to bring them about.

After one has prepared such a list, the next step is to arrange the things that need to be done in the order that they should be undertaken. For example, if lime must be applied before the new cropping program can be successfully placed in operation, it is obvious that arrangements should be made to lime as early as possible in the transition period.

Other examples of changes that should be made early in the transition period might include increases in fertilizer applications, the use of improved varieties of seed, and better balanced livestock rations.

Among those things that would eventually need to be done but could be delayed would be the expansion of a livestock enterprise (assuming that to be a part of the new plan) until after the new crop program is sufficiently well advanced to provide the feed for the larger number of animals. Increases in the size of buildings, etc., would not be made until the larger crop production or livestock program, or both, necessitated it, unless they were the present limiting factors.

Any time during the transition period that a new fence should replace an old one, it should be constructed in keeping with the new proposed field arrangement. All necessary building improvements and replacements of machinery and breeding stock should be made to fit the new plan.

A safe rule to follow in deciding the order in which changes shall be made is to plan to do those things first which if not done will definitely slow up the establishment of the new organization; and to delay making those changes that will not affect the establishment of the plan until later. If postponement of improvements or major repairs will result in a substantial increase in their cost, it is usually desirable to make such improvements and repairs without delay.

After preparing a schedule of the things that must be done and arranging them in the order in which they should be undertaken, the question of how rapidly the change can be made must be given consideration.

The rate of change will depend on the available capital, the amount that can be spared out of current income, and the labor supply. Since the amount of capital available may be fairly easily ascertained, and one's experience with the old program will give some idea as to the amount of labor that will be available for making changes, there remains the problem of finding out how much can be spent above normal operating costs and living expenses towards the establishment of the new plan. To determine this it will be necessary to compute the anticipated receipts and expenses for the first year of the transition period based on present prices adjusted to fit the short-time outlook and the amount of crops, livestock, and livestock products that will be currently produced.

At the end of every year, and before making definite commitments for the new year, the process of estimating receipts and expenses should be repeated

because favorable yields and prices one year may make possible larger expenditures the next. On the other hand, small production or poor prices or both may temporarily stop most of the transition work. Such annual estimates make it possible to determine how fast the new organization can be placed into operation and provides another check on the adaptability of the new program to one's resources.

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Altering the Organization to Meet Constantly Changing Conditions

It is essential to keep in mind that even the best plan of organization cannot be rigidly adhered to each year. Some departure from the plan will be necessary due to uncontrollable factors. Most of the modifications, however, will be of a temporary nature, while others may call for major alterations of a long-time character.

Current disruptions such as arise from extraordinary weather conditions, insect and disease damage, and fluctuation in market prices often make temporary departures from the plan necessary, but usually these fluctuate back and forth, always tending to adhere to the organization previously determined. Generally they are not so extensive as to disrupt the entire program and require that a complete revision be made in the farm organization. They may, however, be of such a nature that it will be well to work out a new feed budget in order that the current crop production and livestock program can be brought into balance by temporary revisions in one or the other, so that no serious feed problem will develop.

The permanent loss of a profitable market outlet for some major product; the establishment of a satisfactory dependable new market outlet; a revolutionary change in production technique such as a shift from horse to tractor power and equipment, or a major shift from hand to machine methods, may have such far reaching effects on type of farming, labor requirements, and income that a complete reorganization of the farm as outlined in detail in this bulletin will prove necessary if the revisions are to be most successfully made.

Inasmuch as it may simplify the task for some, when working out a new or revising an old farm organization, to have forms on which to develop their plans, an attempt has been made to prepare a set of forms for this purpose. A limited supply of these are available and may be obtained from your county agricultural agent or by writing to the Rural Economics Department of the Ohio State University.